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Structure and chance: melding logic and probability for software debugging

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↑ ABSTRACT

Software errors abound in the world of computing. Sophisticated computer programs rank high on the list of the most complex systems ever created by humankind. The complexity of a program or a set of interacting programs makes it extremely difficult to perform offline verification of run-time behavior. Thus, the creation and maintenance of program code is often linked to a process of incremental refinement and ongoing detection and correction of errors. To be sure, the detection and repair of program errors is an inescapable part of the process of software development. However, run-time software errors may be discovered in fielded applications days, months, or even years after the software was last modified—especially in applications composed of a plethora of separate programs created and updated by different people at different times. In such complex applications, software errors are revealed through the run-time interaction of hundreds of distinct processes competing for limited memory and CPU resources. Software developers and support engineers responsible for correcting software problems face difficult challenges in tracking down the source of run-time errors in complex applications. The information made available to engineers about the nature of a failure often leaves open a wide range of possibilities that must be sifted through carefully in searching for an underlying error.

↑ REFERENCES